

CLAIMS

1. A multi-chambered piston actuator, comprising:

a cover comprising a planar surface having a first cavity extending into the inner planer surface, the first cavity defined by a first inner wall having a first cross-sectional area and a recessed cavity wall;

a housing comprising a second cavity, the second cavity comprising a second inner wall defining a second cross-sectional area, a third inner wall defining a third cross-sectional area, a first end wall defining a boundary between said second inner wall and said third inner wall, and a second end wall defining a bottom of the cavity and having a cross-section substantially similar to said third cross-sectional area, the housing further comprising a first port and a second port; and

a piston comprising a shaft, the shaft comprising a first shaft end having a cross-section substantially similar to said first cross-sectional area for insertion into said first cavity, a second shaft end having a cross-section substantially similar to said third cross-sectional area, said piston further comprising a tier extending radially from said shaft, said tier having a cross-sectional area substantially similar to said second cross-sectional area, the tier further having a top surface, a bottom surface, and an outer wall; wherein

the first port is connected to a first chamber formed by said tier top surface, said second inner wall, said planar surface, and a shaft surface, and the second port is connected to a second chamber formed by said tier bottom surface, said second inner wall, said shaft surface, and said first end wall.

2. The piston actuator of claim 1, further comprising:

an inlet port for providing material to the piston actuator;

a discharge port for allowing the material to exit the piston actuator; and

a valve connected to the second shaft end, the valve for controlling a flow rate of the material through the discharge port.

3. The piston actuator of claim 1, further comprising:

a valve connected to the second shaft end; and

a third port connected to a third chamber, the third chamber formed by said second shaft end, said third inner wall, said second end wall, and a surface of said valve.

4. The piston actuator of claim 1, further comprising:
2 a third port connected to a third chamber, the third chamber formed by said first shaft end, said first inner wall; and said recessed cavity wall.
5. The apparatus of claim 1, further comprising means for sealing the tier outer wall
2 with the first inner wall.
6. The apparatus of claim 5, wherein the means for sealing comprise an O-ring.